

storm was apparently central w. of the Bay of Biscay. On the 7th a storm, with pressure below 29.40 (747) and strong gales, appeared s. of Newfoundland, whence it moved ne. and disappeared north of the region of observation after the 8th, and a storm had apparently passed eastward from the British Isles and the Bay of Biscay over the continent of Europe. During the 9th and 10th a storm passed eastward over mid-ocean in high latitudes. On the 11th a storm, with pressure about 29.50 (749) and fresh gales, was central about midway between the Azores and the Grand Banks. By the 12th this storm had apparently advanced n. of e. toward the British Isles.

During the 13th and 14th a storm moved over the north Gulf of Saint Lawrence and the Straits of Belle Isle, and disappeared north of the region of observation. On the 17th a storm, with pressure below 29.70 (754), snow, and sleet was central se. of Newfoundland, whence it moved slowly ene., with fresh to strong gales, and disappeared over mid-ocean after the 19th. On the 20th 2 storms of considerable energy were central e. of the Grand Banks, one of which had advanced from the Gulf of Saint Lawrence and the other was apparently a secondary development to the storm which had moved ene. from the Grand Banks from the 17th to 19th. The morning of the 21st the two storms referred to had changed their position but slightly; by the 22d they had apparently united and a storm of marked strength was central e. of the Banks of Newfoundland. On this date a storm was apparently central about midway between the Bay of Biscay and the Azores, whence it moved eastward and disappeared after the 23d.

On the 23d the storm central e. of the Grand Banks on the 22d was central nw. of the Azores, with pressure below 29.50 (749) and strong gales; by the 24th this storm had moved ne. of the Azores; on the 25th it was apparently central about midway between the Azores and the Bay of Biscay; on the 26th and 27th it was central sw. of Ireland; and on the 28th it had apparently moved s. of the British Isles over the continent of Europe. On the 24th a storm, with pressure below 29.40 (747), was central n. of Newfoundland, having advanced from the Gulf of Saint Lawrence, after which it disappeared n. of the region of observation. On the 25th a storm, with pressure below 29.30 (744), was central s. of Newfoundland, whence it moved ne. and disappeared n. of the region of observation after the 27th. On the 25th a storm of moderate strength was central off the e. Florida coast, whence it moved northeastward, and at the close of the month was central e. of Nova Scotia. From the 26th to the 30th the pressure continued low over mid-ocean. On the 29th the pressure fell to 29.40 (747) in the Hebrides Islands, and it continued low over the British Isles during the 30th.

OCEAN ICE IN APRIL.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for April during the last 9 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
April, 1883	40 49	52 06	April, 1883	48 00	43 00
April, 1884	41 26	48 46	April, 1884	45 25	43 34
April, 1885	41 40	49 50	April, 1885	44 10	39 41
April, 1886	40 51	46 39	April, 1886	47 43	30 11
April, 1887	40 02	50 04	April, 1887	48 00	38 18
April, 1888	41 33	50 00	April, 1888	47 40	49 00
April, 1889	43 57	50 20	April, 1889	47 16	43 11
April, 1890	40 00	49 40	April, 1890	47 26	35 42
April, 1891	40 01	48 24	April, 1891	45 33	43 32
Mean	41 13	49 32	Mean	46 48	40 41

*Isolated iceberg.

Ice was reported about 1° south and about 3° west of the average southern and eastern limits of Arctic ice for April. The southernmost ice reported was a square, flat berg, observed on the 13th, and the easternmost ice reported was an iceberg noted on the 20th, in the positions given in the table. Ice was most frequently encountered along the se. edge of the Banks of Newfoundland, but was reported westward to the Newfoundland coast. Large quantities of field ice in the Gulf of Saint Lawrence and on the Cape Breton, east Nova Scotia, and west Newfoundland coasts seriously interfered with navigation. Compared with the corresponding month of preceding years the Arctic ice reported for the current month about corresponded in quantity and distribution with the April average. The positions of Arctic ice reported for April, 1891, are shown on Chart I by ruled shading.

FOG IN APRIL.

The limits of fog-belts west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on 10 dates; between the 55th and 65th meridians on 6 dates; and west of the 65th meridian on 3 dates. Compared with the corresponding month of the last 3 years the dates of occurrence of fog near the Grand Banks was 7 less than the average; between the 55th and 65th meridians 6 less than the average; and west of the 65th meridian 9 less than the average. Fog was generally reported in the east quadrants of general storms which advanced eastward from the American continent. On the 4th, 11th, 12th, 14th to 19th, and 21st dense fog was reported at points along the New England, New York, and New Jersey coasts, its occurrence, as a rule, attending the approach of general storms whose influence extended off the coast.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for April, 1891, is exhibited on Chart II by dotted isotherms. In the table of Signal Service data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

The mean temperature was highest in extreme southeast California, southwest Arizona, and south Florida, where it was above 70°, and the mean temperature was above 60° in the east and west Gulf states, in the Mississippi Valley north-

ward to the lower Ohio valley, over the southwest part of the southern plateau, and from south California over the San Joaquin and Sacramento valleys. The mean temperature was lowest in the lower Saint Lawrence valley, in extreme north Ontario, and at mountain stations in central Colorado, where it was below 35°, and the mean temperature was below 40° in northeast New England, the north part of the upper lake region, from south-central Wyoming to north-central New Mexico, in the northeast part of lower Idaho, and at stations on the Central Pacific Railway crossing the summit of the Sierra Nevada Mountains in California.

The mean temperature was above the normal north of a line traced from the south Atlantic coast northwestward to the extreme north Pacific coast; to the southward of this line the month was cooler than the average April. The greatest departure above the normal temperature occurred from the Red River of the North Valley north and northwest over the Brit-

ish Possessions, where it was more than 5, and the greatest departure below the normal temperature occurred over extreme south Florida, in southeast Texas, and in northwest California.

The morning of the 6th the coldest weather on record for the season occurred over north Florida and south Georgia, the minimum temperature at Savannah and Jacksonville, 30 and 34, respectively, being 3 below the lowest temperature previously recorded during the first decade of April. The condition of low temperature moved southward and extended over the entire Florida Peninsula by the 7th, producing the coldest weather ever known in that region for the season. From the 24th to 27th the warmest weather on record for the season occurred in Montana, the Dakotas, north Minnesota, and upper Michigan.

The mean temperature from January to April, inclusive, averaged about normal in the east Gulf states, the Rio Grande and Missouri valleys, and on the Pacific coast. In the extreme northwest the average excess in temperature for this period was about 4; in the Lake region about 3; in the New England and middle Atlantic states about 2; and in the south Atlantic states, the Ohio Valley and Tennessee, the upper Mississippi valley, and over the north plateau region about 1. The deficiency in temperature for this period averaged about 3 in the middle plateau region, about 2 in the southern plateau region, and about 1 at Key West Fla., in the west Gulf states, and on the eastern slope of the Rocky Mountains.

The highest mean temperature ever reported for April was noted at Boston, Mass., in 1891, when the mean temperature was 2.9 above the normal and 0.2 above the highest mean temperature previously reported for April, noted in 1889; at Newburyport, Mass., where the mean temperature was 3.5 above the normal, and the same as 1886; at Moorhead, Minn., where the mean temperature was 7.0 above the normal, and 1.3 above 1886; at Saint Vincent, Minn., where the mean temperature was 7.9 above the normal, and 0.6 above 1886; and at Wellington, Kans., where the mean temperature was 4.6 above the normal, and 1.2 above 1880; from North Dakota westward to the north Pacific coast in 1889, when the mean temperature was 4 to 6 above the normal; from the middle-eastern slope of the Rocky Mountains westward to the Pacific coast between the 39th and 45th parallels, in 1888, when the mean temperature was 4 to 12 above the normal in north California and Oregon, 5 to 8 above in the middle and southern plateau, and 3 to 6 above on the middle-eastern slope of the Rocky Mountains; from the upper Mississippi and lower Missouri valleys eastward over the Lake region and the middle Atlantic states and New England, save along the immediate middle Atlantic and south New England coasts, in 1878, when the mean temperature was 5 to 6 above the normal in the upper Mississippi and Ohio valleys, about 5 above in the middle Atlantic states and New England, and 6 to 10 above in the Lake region.

The lowest mean temperature ever reported for April occurred at Key West, Fla., in 1891, when the mean temperature was 2.8 below the normal and 0.9 below the lowest mean temperature previously reported for April, noted in 1889; at Grand Coteau, La., where the mean temperature was 1.7 below the normal, and 0.6 below 1884, and at Rio Grande City, Tex., where the mean temperature was 4.1 below the normal, and 2.1 below 1888; from the Mississippi River east and northeast over the middle Atlantic states and New England in 1874, when the mean temperature was 5 to 10 below the normal in the Mississippi and Ohio valleys, the Lake region, and the middle Atlantic states, and 5 to 8 below in New England.

DEVIATIONS FROM NORMAL TEMPERATURE.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for April for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for April, 1891; (4) the departure of the current month from the normal;

(5) and the extreme monthly mean for April, during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of April.	(2) Length of record.	(3) Mean for April, 1891.	(4) Departure from normal.	(5) Extreme monthly mean for April.			
						Highest.	Year.	Lowest.	Year.
<i>Arkansas.</i>			Years						
Lead Hill.....	Boone.....	62.0	9	61.4	-0.6	65.3	1888	56.7	1884
<i>California.</i>									
Sacramento.....	Sacramento.....	59.2	38	54.4	-4.8	63.3	1857	54.4	1891
<i>Connecticut.</i>									
Middletown.....	Middlesex.....	45.6	24	48.9	+3.3	50.9	1865	38.3	1874
<i>Florida.</i>									
Merritt's Island.....	Brevard.....	71.7	9	70.3	-1.4	75.4	1883	67.0	1886.
<i>Georgia.</i>									
Forsyth.....	Monroe.....	65.0	17	66.5	+1.5	68.8	1888	61.0	1875
<i>Illinois.</i>									
Peoria.....	Peoria.....	52.5	35	56.1	+3.6	57.9	1878	40.6	1857
Riley.....	McHenry.....	44.6	35	47.8	+3.2	52.2	1856	35.5	1874
<i>Indiana.</i>									
Vevay.....	Switzerland.....	55.1	24	56.9	+1.8	60.5	1866	47.4	1874
<i>Iowa.</i>									
Cresco.....	Howard.....	43.2	19	46.7	+3.5	47.3	1878	37.5	1874
Monticello.....	Jones.....	48.3	37	50.0	+1.7	50.0	1855	38.0	1857
Logan.....	Harrison.....	50.6	17	55.2	+4.6	56.2	1890	42.6	1874
<i>Kansas.</i>									
Lawrence.....	Douglas.....	54.6	23	57.0	+2.4	59.6	1876	47.7	1874
Wellington.....	Sumner.....	50.2	12	60.0	+9.8	60.8	1891	50.7	1884
<i>Louisiana.</i>									
Grand Coteau.....	Saint Landry.....	69.7	8	68.0	-1.7	70.9	1885	68.0	1891
<i>Maine.</i>									
Orono.....	Penobscot.....	39.8	21	41.3	+1.5	45.1	1889	33.3	1874
<i>Maryland.</i>									
Cumberland.....	Allegany.....	48.8	32	54.2	+5.4	57.6	1881	42.2	1859
<i>Massachusetts.</i>									
Amherst.....	Hampshire.....	45.4	55	48.0	+2.6	52.2	1839, '78	38.3	1874
Newburyport.....	Essex.....	44.0	11	47.5	+3.5	47.5	1886, '91	41.4	1888
Somerset.....	Bristol.....	45.3	18	49.4	+4.1	51.8	1878	38.7	1874
<i>Michigan.</i>									
Kalamazoo.....	Kalamazoo.....	46.9	14	49.8	+2.9	52.9	1873	42.0	1881
Thornville.....	Lapeer.....	45.0	14	48.3	+3.3	52.1	1878	42.3	1881, '88
<i>Minnesota.</i>									
Minneapolis.....	Hennepin.....	43.5	25	47.8	+4.3	49.2	1886	36.6	1874
<i>Montana.</i>									
Fort Shaw.....	Lewis & Clarke.....	44.7	21	49.7	+5.0	51.2	1870	38.6	1882
<i>New Hampshire.</i>									
Hanover.....	Grafton.....	41.2	56	45.5	+4.3	46.9	1887	33.7	1874
<i>New Jersey.</i>									
Moorestown.....	Burlington.....	49.3	27	51.9	+2.6	55.1	1865	42.3	1874
South Orange.....	Essex.....	47.7	20	50.9	+3.2	52.9	1878	42.2	1874
<i>New York.</i>									
Cooperstown.....	Otsego.....	40.8	37	44.0	+3.2	51.6	1878	33.6	1874
Palermo.....	Oswego.....	41.1	31	45.3	+4.2	50.0	1878	32.4	1874
<i>North Carolina.</i>									
Lenoir.....	Caldwell.....	55.7	18	57.6	+1.9	60.0	1887	42.6	1885
<i>Ohio.</i>									
N'th Lewisburgh.....	Champaign.....	51.0	59	53.0	+2.0	63.0	1888	39.0	1857
Wauseon.....	Fulton.....	46.4	21	49.6	+3.2	54.8	1878	38.6	1874
<i>Oregon.</i>									
Albany.....	Linn.....	51.6	13	50.8	-0.8	55.4	1888	48.4	1882
Eola.....	Polk.....	49.5	20	48.4	-1.1	54.8	1875	43.2	1872
<i>Pennsylvania.</i>									
Dyberry.....	Wayne.....	42.1	25	44.3	+2.2	49.7	1878	35.0	1874
Grampian Hills.....	Clearfield.....	43.3	20	46.0	+2.7	52.2	1878	29.0	1875
Wellsborough.....	Tioga.....	43.8	12	45.4	+1.6	52.2	1886	40.1	1881
<i>South Carolina.</i>									
Statesburgh.....	Sumter.....	62.3	10	63.0	+0.7	64.6	1882	60.1	1884
<i>Tennessee.</i>									
Austin.....	Wilson.....	59.1	21	61.6	+2.5	65.3	1878	53.9	1874
<i>Texas.</i>									
New Ulm.....	Austin.....	68.6	18	68.6	0.0	71.5	1878, '80	63.6	1874
<i>Vermont.</i>									
Strafford.....	Orange.....	40.6	18	44.5	+3.9	48.3	1886	34.9	1874
<i>Virginia.</i>									
Birdsnest.....	Northampton.....	54.5	23	56.6	+2.1	61.6	1880	49.4	1875
<i>Washington.</i>									
Fort Townsend.....	Jefferson.....	48.8	17	48.3	-0.5	52.4	1889	36.2	1859
<i>Wisconsin.</i>									
Madison.....	Dane.....	44.5	23	46.4	+1.9	49.8	1870	37.4	1874

MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported by a regular station of the Signal Service was 102, at Yuma, Ariz., and the maximum temperature was above 90 in the lower Colorado and Gila valleys, in the upper San Joaquin valley, from Kansas northward over the Dakotas, and at Rio Grande City, Tex. The lowest maximum temperature reported was 57, at Tatoosh Island, Wash., and the maximum temperature was below 70 on the immediate north Pacific coast, over a greater part of Maine, and on the southeast New England coast. At the following-named stations the maximum temperature was as high or higher than previously reported for April: Chattanooga, Tenn., 89, the same as 1887; Louisville, Ky., 88, the same as 1883; Cincinnati, Ohio, 85, the same as 2 or more years; Toledo, Ohio, 86, 1 above 1888; Alpena, Mich., 79, the

same as 1885; Grand Haven, Mich., 81, 1 above 1883; Marquette, Mich., 87, 5 above 1887; Duluth, Minn., 81, 1 above 1887; Saint Vincent, Minn., 90, 6 above 1887; Moorhead, Minn., 91, 5 above 1887; Bismarck, N. Dak., 90, 3 above 1887; Fort Sully, S. Dak., 93, the same as 1874; Valentine, Nebr., 89, the same as 1887; Omaha, Nebr., 90, 1 above 1880; Fort Stanton, N. Mex., 78, the same as 1887; Fort Custer, Mont., 86, 2 above 1881; Fort Assiniboine, Mont., 84, 3 above 2 or more years; Helena, Mont., 82, 4 above 2 or more years; and Port Angeles, Wash., 67, the same as 1885.

The reports of United States Army post surgeons and voluntary observers show the following maximum temperatures in states and territories where temperature rising to or above 90 was reported for April, 1891: Volcano Springs, Cal., 112; Maricopa, Ariz., 108; Oelrichs, S. Dak., 102; Eureka Ranch, Kans., 101; Beaver City and Lexington, Nebr., 100; Moab, Utah, 97; Camp Del Rio and Fort Hancock, Tex., Denison, Iowa, and Glendive, Mont., 96; Portsmouth (2), Ohio, 95; Richmond, Va., and Archer, Fla., 94; Lead Hill, Ark., and Vaiden, Miss., 93; Winnsborough, S. C., Wiggins, Ala., several stations in Colorado, Louisville, Ga., Frankfort (2), Ky., and Kinbrae, Minn., 92; Harriman, Tenn., 91; several stations in N. Dak., Guthrie, Okla. T., Flora, Ill., Huntingburgh, Ind., Fort Supply, Ind. T., and Liberty Hill, La., 90.

The lowest temperature reported by a regular station of the Signal Service was 6, at Saint Vincent, Minn., Fort Washakie, Wyo., and Denver, Colo. The minimum temperature was below 10 in extreme north New England, in extreme east upper Michigan, and from North Dakota southwestward over central Wyoming and thence southeast over central Colorado. The minimum temperature was below 20 north of a line traced from east-central Maine west-southwest to south New Mexico, thence northwestward to northwest Nevada, and thence east of north to west Montana. At the following-named stations of the Signal Service the minimum temperature was as low or lower than previously reported for April: Charlotte, N. C., 26, 2 below 1881; Jacksonville, Fla., 34, 3 below 1881; Key West, Fla., 54, 7 below 2 or more years; Pensacola, Fla., 34, the same as 1881; Mobile, Ala., 32, the same as 1881; Palestine, Tex., 36, the same as 1886; Fort Smith, Ark., 28, 2 below 1887; Montrose, Colo., 17, 1 below 1886; San Francisco, Cal., 40, the same as 1875; Port Angeles, Wash., 27, 1 below 1890.

The reports of United States Army post surgeons and voluntary observers shows the following minimum temperatures in states and territories where temperature falling to or below 20 was reported for April, 1891: Breckenridge, Colo., -35; Henry's Lake, Idaho, -14; Chama, N. Mex., -11; Hayward, Wis., -5; Leech Lake and Pine River, Minn., and Gallatin, N. Dak., 0; Gaylord, Mich., 1; West Milan, N. H., 2; Fort D. A. Russell, Wyo., 4; Ely, Nev., 5; Fort Niobrara, Nebr., and Jacksonville, Vt., 6; Orangeville, Ohio, and Webster, S. Dak., 7; Keene Valley, N. Y., and Beaver, Utah, 8; Martinsdale, Mont., 9; Point Isabel, Ind., Greenville, Pa., and Lapush, Wash., 11; Boca, Cal., Farmington, Me., and Monson, Mass., 12; Eureka Ranch, Kans., 13; Larrabee, Iowa, Beulah and Joseph, Oregon, and Tannery, W. Va., 14; Canton, Conn., Adrian, Mo., and Marion, Va., 15; Aurora (1), Ill., and Fort Supply, Ind. T., 17; Cooley's, Ariz., several stations in N. J., Franklin, N. C., and Kingston (2), R. I., 20.

LIMITS OF FREEZING WEATHER.

The southern limit of freezing weather is shown on Chart IV by a line traced from the Virginia coast, southwest to extreme south Alabama, thence west of north to west Tennessee, thence south of west to south New Mexico, and thence north of west to extreme south Nevada, and the western limit of freezing weather is shown by this line continued northward over east California to southwest Oregon, thence northeast over the valley of the Columbia River, and thence northwestward to extreme northwest Washington.

RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature are given in the table of Signal Service data. The greatest monthly ranges of temperature occurred in North Dakota and northwest Minnesota, where they exceeded 80, whence they decreased eastward to less than 40 on the New England coast, southeast to less than 30 over extreme south Florida, southward to less than 40 on the west Gulf coast, southwest to less than 40 on the middle and south Pacific coasts, and west to less than 30 on the north Pacific coast.

FROST.

Killing frost was generally reported in the Gulf and south Atlantic states, and in Florida as far south as Jupiter Inlet and Lee county, from the 3d to 7th. In Florida vines, fruits, and vegetables were injured. At Tampa, Fla., the heavy frost of the 7th was reported the first ever observed in that locality. The observer reports, however, that frost probably occurred in that section in April, 1857, when the temperature fell to 26 at Tampa, to 32 at Fort Myers, to 30 at Fort Pierce, on Indian River, and at Fort Dallas. There is positive evidence of frost and ice on December 25th and 26th, 1856, and January 20th, 1857, at Fort Dallas, Fla., which is below the 26th parallel, and Assistant Surgeon R. F. Simpson, U. S. Army, reported that in April, 1857, frost and ice occurred at that place, and that on the morning of January 20th, 1857, the thermometer was 30. At Jupiter, Fla., the killing frost of the 7th seriously injured fruit and vegetables. At De Land, Fla., the new tender growth of evergreen trees was injured. In Georgia fruit was injured and vines and vegetables killed. In the Carolinas fruit was injured and tender plants and early vegetables damaged. In Alabama young buds were nipped and delicate vegetation destroyed. In Mississippi and Louisiana fruit and early vegetables were considerably injured. At Memphis, Tenn., killing frost damaged peaches on the 4th. On the 21st the peach crop at Barren Creek Springs, Md., was damaged. On the 25th light frost injured tender plants and grapevines at Walla Walla, Wash. On the 26th frost damaged young crops and grapevines at Egg Harbor City, N. J. On the 29th frost injured garden vegetables at Philo, Ill., and killed asparagus plants at Dyberry, Pa.

Compared with the preceding month the southern limit of frost for April, 1891, was about 3° farther south in Florida. In Texas the southern limit was about the same. In Arizona the southern limit in April was about 1° farther north, and in California the southern limit was about the same.

The killing frost on the 5th to 7th in Florida was about 2 months late, and that of the 3d to 7th in the Gulf States was about 1 month late, when compared with the average date of last killing frost in the respective localities.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for April, 1891, as determined from the reports of nearly 2,000 stations, is exhibited on Chart III. In the table of Signal Service data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal

show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The heaviest monthly precipitation reported was 13.84, at Gallinas, Tex.; 13.74 fell at Huntsville, Tex.; 11.84 at Neah Bay, Wash.; 11.35 at Bandon, Oregon; and 11.22 at Upper Mattole, Cal. The precipitation exceeded 8.00 generally along